

Date: Thursday, 5/4/2006 10:46:27 AM
User: Kim Johnston

Process Sheet

Customer : CU-DAR001 Dart Helicopters Services
Job Number : 26974
Estimate Number : 10533
P.O. Number : N/A
This Issue : 5/4/2006 S.O. No. : N/A
Prsht Rev. : NC
First Issue : N/A Type : MACHINED PARTS
Previous Run : 26562
Written By : SERP COMMENT RELO
Checked & Approved By : 06.05.04
Comment : Est: I As Per RevE 06-01-27 JLM

Drawing Name : SADDLE FITTING, AFT (OUTBOARD/INBOARD)
Part Number : D2573
Drawing Number : D2573 REV E
Project Number : N/A
Drawing Revision : E
Material : N/A
Due Date : 5/25/2006 Qty: 12 Um: Each

Additional Product

Job Number:



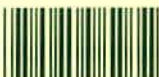
Seq. #: Machine Or Operation: Description :

1.0 D6101007 7075-T7351 8.25X7.75X2.5



Comment: Qty.: 1.0000 Each(s)/Unit Total : 12.0000 Each(s)
7075-T7351 8.25X7.75X2.5
Make from D6101-007 billet for D2573
Ensure that grain is along 7.75" length
Batch No: B24070

2.0 HAAS1 HAAS CNC VERTICAL MACHINING #1



Comment: HAAS CNC VERTICAL MACHINING #1
Program Batch No. 26974 Double check by: J.L

1-Machine Step No 1 per Folio FA051 and inspect per attached Dimension Sheets
2-Machine Step No 2 per Folio FA051 and inspect per attached Dimension Sheets
3-Machine Step No 3 per Folio FA051 and inspect per attached Dimension Sheets
4-Deburr and remove all machining marks
5-Tumble to remove sharp edges.

Ep 06/06/21
J.G 06/06/18

x 8

3.0 MILLING CONV. CONVENTIONAL MILLING MACHINE



Comment: CONVENTIONAL MILLING MACHINE
Machine keyway as per dwg D2573 & D2574

Ep 06/06/21

x 8

4.0 QC2 INSPECT PARTS AS THEY COME OFF MACHINE



Comment: INSPECT PARTS AS THEY COME OFF MACHINE


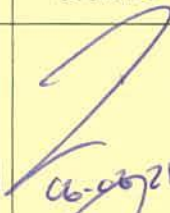
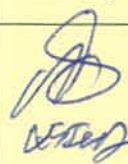
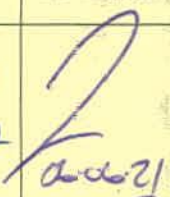
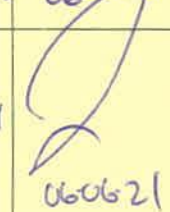

Ep 06/06/21

x 8

Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes ☒ No ☐ DQA: TD Date: 2/26/26
 QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
06/05/24	2	the wall thickness of dimension "w" one side too small .101" and dimension "I" too long .522" and dimension "k" too long .585"		Scrap / destroy and replace	En 06/06/21			
06.06.20	1	Dimension 0.362 is 0.340 on one side of part & 0.352 on other see attached sheets	CP 06.06.20 per QSI 042	PART IS OK PER QS. EMAIL	cp 06/06/21		CP 06.06.20 per QSI 042	

NOTE: Date & initial all entries

Date: Thursday, 5/4/2006 10:46:27 AM
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Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: SADDLE FITTING, AFT (OUTBOARD/INBOARD)

Job Number: 26974

Part Number: D2573

Job Number:



Seq. #:

Machine Or Operation:

Description :

5.0

QC8

SECOND CHECK



Comment: SECOND CHECK

Tr 06/06/21

8

6.0

HAND FINISHING1

HAND FINISHING RESOURCE #1



Comment: HAND FINISHING RESOURCE #1

Acid etch and Alodine as per QSI 005 4.1

DC 06/06/22 (8)

7.0

POWDER COATING

POWDER COATING



Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

DC 06/06/22 (8)

8.0

QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT

PC 6/6/23 (8)

9.0

PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location: *57480*

PC 6/6/23 (8)

10.0

DC

DOCUMENT CONTROL



Comment: DOCUMENT CONTROL

Inspection Level 21

SP 06/06/26 (8)

Job Completion



CL 06/06/26

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
01/01/01								

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	26974
Description: Saddle, Aft Outboard	Part Number:	D2573
Inspection Dwg: D2573 Rev. E		Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing D2573 Rev. E and record below:

Dim	Min	Max	Go/No Go Gauge	Recorded Actual Dimensions				By	Date
				1	2	3	4		
A	0.438	0.443	DT8682	✓	0.440	0.440	✓		
B	1.745	1.755		1.748	1.749	1.750	1.746		
C	3.495	3.505		3.499	3.499	3.501	3.498		
D	1.745	1.755		1.748	1.750	1.750	1.746		
E	7.990	8.010		7.999	8.001	8.003	8.004		
F	0.490	0.510		0.490	0.497	0.498	0.494		
G	0.257	0.262	DT8683		0.258	0.258	✓		
H	0.375	0.380	DT8684	✓	0.376	0.376	✓		
I	0.490	0.510		0.499	0.499	0.501	0.498		
J	1.174	1.184		1.178	1.180	1.180	1.178		
K	0.558	0.578			0.566	0.568	0.566		
L	1.174	1.184		1.178	1.180	1.180	1.178		
M	1.365	1.375			1.371	1.372	1.368		
N	2.495	2.505			2.497	2.497	2.497		
O	4.119	4.129			4.121	4.121	4.126		
P	0.115	0.135			0.124	0.124	0.127		
Q	0.115	0.135			0.134	0.134	0.135		
R	0.240	0.260			0.247	0.246	0.252		
S	0.115	0.135			0.116	0.119	0.122		
T	0.178	0.198		0.188	0.188	0.188	0.188		
U	3.210	3.250			3.231	3.232	3.230		
V	0.230	0.250		0.233	0.235	0.234	0.232		
W	0.115	0.135			0.118	0.114	0.125		
X	0.308	0.313			0.310	0.310	0.310		
Y	0.760	0.765			0.761	0.761	0.765		
Z	0.352	0.372		0.372	0.364	0.365	0.365		
AA	0.470	0.530		0.500	0.500	0.500	0.500		
AB	0.615	0.635		0.624	0.625	0.628	0.627		
AC	0.053	0.073		0.063	0.063	0.063	0.063		
AD	0.240	0.260		0.243	0.241	0.242	0.240		
AE	1.500	1.520		1.513	1.518	1.518	1.515		
AF	0.115	0.135		0.127	0.127	0.126	0.135		
AG	0.240	0.280		0.272	0.270	0.265	0.260		
AH	0.240	0.260		0.245	0.240	0.241	0.243		
AI	2.000	2.020		2.006	2.005	2.006	2.001		
AJ	0.023	0.043		0.033	0.033	0.033	0.033		
Accept/Reject									

Measured by:	S.G.
Date:	06/05/25

Audited by:	Er
Date:	06/06/21

Rev	Date	Change	Revised by	Approved
A		New Issue	RF	
B	02.09.26	Re-format; Added Rev. D	KJ	
C	02.10.11	Re-format; Added DT8682, DT8683, DT8684	KJ	
D	05.05.05	Added dimension AI	KJ/RF	
E	05.12.05	Added dimension AJ	KJ/JLM	

2010/11/10

DART AEROSPACE LTD	Work Order:	26974
Description: Saddle, Aft Outboard	Part Number:	D2573
Inspection Dwg: D2573 Rev. E		Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing D2573 Rev. E and record below:

Dim	Min	Max	Go/No Go Gauge	Recorded Actual Dimensions				By	Date
				1	2	3	4		
A	0.438	0.443	DT8682	✓	✓	✓	✓		
B	1.745	1.755		1.746	1.746	1.746	1.747		
C	3.495	3.505		3.498	3.499	3.499	3.497		
D	1.745	1.755		1.746	1.746	1.746	1.747		
E	7.990	8.010		8.004	8.002	8.000	8.998		
F	0.490	0.510		0.495	0.495	0.499	0.497		
G	0.257	0.262	DT8683	0.258	✓	✓	0.258		
H	0.375	0.380	DT8684	0.376	✓	✓	0.376		
I	0.490	0.510		0.496	0.496	0.496	0.498		
J	1.174	1.184		1.175	1.175	1.175	1.176		
K	0.558	0.578		0.563	0.563	0.563	0.564		
L	1.174	1.184		1.175	1.175	1.175	1.176		
M	1.365	1.375		1.369	1.370	1.371	1.372		
N	2.495	2.505		2.498	2.499	2.498	2.497		
O	4.119	4.129		4.121	4.121	4.121	4.121		
P	0.115	0.135		0.127	0.125	0.125	0.124		
Q	0.115	0.135		0.135	0.135	0.135	0.135		
R	0.240	0.260		0.251	0.250	0.249	0.251		
S	0.115	0.135		0.115	0.115	0.116	0.110		
T	0.178	0.198		0.188	0.188	0.188	0.188		
U	3.210	3.250		3.230	3.230	3.230	3.231		
V	0.230	0.250		0.232	0.235	0.235	0.234		
W	0.115	0.135		0.124	0.124	0.124	0.125		
X	0.308	0.313		0.310	0.310	0.310	0.310		
Y	0.760	0.765		0.765	0.765	0.765	0.765		
Z	0.352	0.372		0.365	0.360	0.360	0.364		
AA	0.470	0.530		0.500	0.500	0.500	0.500		
AB	0.615	0.635		0.626	0.625	0.629	0.628		
AC	0.053	0.073		0.063	0.063	0.063	0.063		
AD	0.240	0.260		0.246	0.240	0.246	0.247		
AE	1.500	1.520		1.512	1.514	1.514	1.510		
AF	0.115	0.135		0.135	0.135	0.135	0.134		
AG	0.240	0.280		0.260	0.260	0.260	0.261		
AH	0.240	0.260		0.242	0.245	0.244	0.247		
AI	2.000	2.020		2.002	2.004	2.002	2.000		
AJ	0.023	0.043		0.033	0.030	0.030	0.033		
Accept/Reject									

Measured by:	EP / J.G
Date:	06/06/13

Audited by:	mf
Date:	06/06/12

Rev	Date	Change	Revised by	Approved
A		New Issue	RF	
B	02.09.26	Re-format; Added Rev. D	KJ	
C	02.10.11	Re-format; Added DT8682, DT8683, DT8684	KJ	
D	05.05.05	Added dimension AI	KJ/RF	
E	05.12.05	Added dimension AJ	KJ/JLM	

DART AEROSPACE LTD	Work Order:	26974
Description: Saddle, Aft Outboard	Part Number:	D2573
Inspection Dwg: D2573 Rev. E		Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing D2573 Rev. E and record below:

				Recorded Actual Dimensions				By	Date
Dim	Min	Max	Go/No Go Gauge	1	2	3	4		
A	0.438	0.443	DT8682	0.440	0.440	0.440	0.440		
B	1.745	1.755		1.747	1.745	1.745	1.748		
C	3.495	3.505		3.497	3.496	3.496	3.496		
D	1.745	1.755		1.747	1.745	1.745	1.748		
E	7.990	8.010		8.001	8.001	8.003	8.004		
F	0.490	0.510		0.502	0.498	0.495	0.502		
G	0.257	0.262	DT8683	0.257	0.257	0.257	0.257		
H	0.375	0.380	DT8684	0.377	0.377	0.377	0.377		
I	0.490	0.510		0.498	0.497	0.499	0.496		
J	1.174	1.184		1.175	1.175	1.175	1.175		
K	0.558	0.578		0.562	0.560	0.565	0.561		
L	1.174	1.184		1.175	1.175	1.175	1.175		
M	1.365	1.375		1.365	1.366	1.366	1.367		
N	2.495	2.505		2.496	2.496	2.496	2.495		
O	4.119	4.129		4.120	4.120	4.120	4.120		
P	0.115	0.135		0.125	0.125	0.126	0.125		
Q	0.115	0.135		0.135	0.135	0.135	0.135		
R	0.240	0.260		0.252	0.253	0.257	0.252		
S	0.115	0.135		0.126	0.123	0.124	0.120		
T	0.178	0.198		0.188	0.188	0.188	0.188		
U	3.210	3.250		3.230	3.230	3.230	3.230		
V	0.230	0.250		0.240	0.238	0.238	0.237		
W	0.115	0.135		0.130	0.126	0.126	0.121		
X	0.308	0.313		0.310	0.310	0.310	0.310		
Y	0.760	0.765		0.765	0.765	0.765	0.765		
Z	0.352	0.372		0.365	0.370	0.367	0.369		
AA	0.470	0.530		0.500	0.500	0.500	0.500		
AB	0.615	0.635		0.633	0.632	0.633	0.628		
AC	0.053	0.073		0.063	0.063	0.063	0.063		
AD	0.240	0.260		0.244	0.245	0.245	0.244		
AE	1.500	1.520		1.518	1.507	1.504	1.508		
AF	0.115	0.135		0.135	0.135	0.135	0.135		
AG	0.240	0.280		0.260	0.260	0.260	0.260		
AH	0.240	0.260		0.253	0.251	0.248	0.245		
AI	2.000	2.020		2.000	2.000	2.000	2.000		
AJ	0.023	0.043		0.030	0.030	0.030	0.030		
Accept/Reject									

Measured by:	EP
Date:	06/06/21

Audited by:	gml
Date:	06/06/21

Rev	Date	Change	Revised by	Approved
A		New Issue	RF	
B	02.09.26	Re-format; Added Rev. D	KJ	
C	02.10.11	Re-format; Added DT8682, DT8683, DT8684	KJ	
D	05.05.05	Added dimension AI	KJ/RF	
E	05.12.05	Added dimension AJ	KJ/JLM	

DART AEROSPACE LTD	Work Order:	26944
Description: Saddle, Aft Outboard	Part Number:	D2573
Inspection Dwg: D2573 Rev. E		Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing D2573 Rev. E and record below:

Dim	Min	Max	Go/No Go Gauge	Recorded Actual Dimensions				By	Date
				1	2	3	4		
A	0.438	0.443	DT8682	0.441	0.441	0.441			
B	1.745	1.755		1.745	1.748	1.745			
C	3.495	3.505		3.496	3.499	3.496			
D	1.745	1.755		1.745	1.748	1.745			
E	7.990	8.010		8.003	8.004	8.005			
F	0.490	0.510		0.496	0.499	0.496			
G	0.257	0.262	DT8683	0.259	0.259	0.259			
H	0.375	0.380	DT8684	0.377	0.377	0.377			
I	0.490	0.510		0.497	0.498	0.499			
J	1.174	1.184		1.176	1.179	1.175			
K	0.558	0.578		0.561	0.564	0.563			
L	1.174	1.184		1.176	1.179	1.175			
M	1.365	1.375		1.369	1.368	1.366			
N	2.495	2.505		2.497	2.496	2.496			
O	4.119	4.129		4.123	4.123	4.120			
P	0.115	0.135		0.125	0.127	0.126			
Q	0.115	0.135		0.135	0.135	0.135			
R	0.240	0.260		0.253	0.253	0.253			
S	0.115	0.135		0.120	0.126	0.121			
T	0.178	0.198		0.188	0.188	0.188			
U	3.210	3.250		3.230	3.230	3.230			
V	0.230	0.250		0.239	0.236	0.238			
W	0.115	0.135		0.127	0.124	0.125			
X	0.308	0.313		0.310	0.310	0.310			
Y	0.760	0.765		0.765	0.765	0.760			
Z	0.352	0.372		0.366	0.368	0.340			
AA	0.470	0.530		0.500	0.500	0.500			
AB	0.615	0.635		0.633	0.631	0.633			
AC	0.053	0.073		0.063	0.063	0.063			
AD	0.240	0.260		0.244	0.244	0.246			
AE	1.500	1.520		1.511	1.515	1.510			
AF	0.115	0.135		0.135	0.135	0.135			
AG	0.240	0.280		0.260	0.260	0.260			
AH	0.240	0.260		0.257	0.249	0.248			
AI	2.000	2.020		2.001	2.005	2.000			
AJ	0.023	0.043		0.030	0.030	0.030			
Accept/Reject									

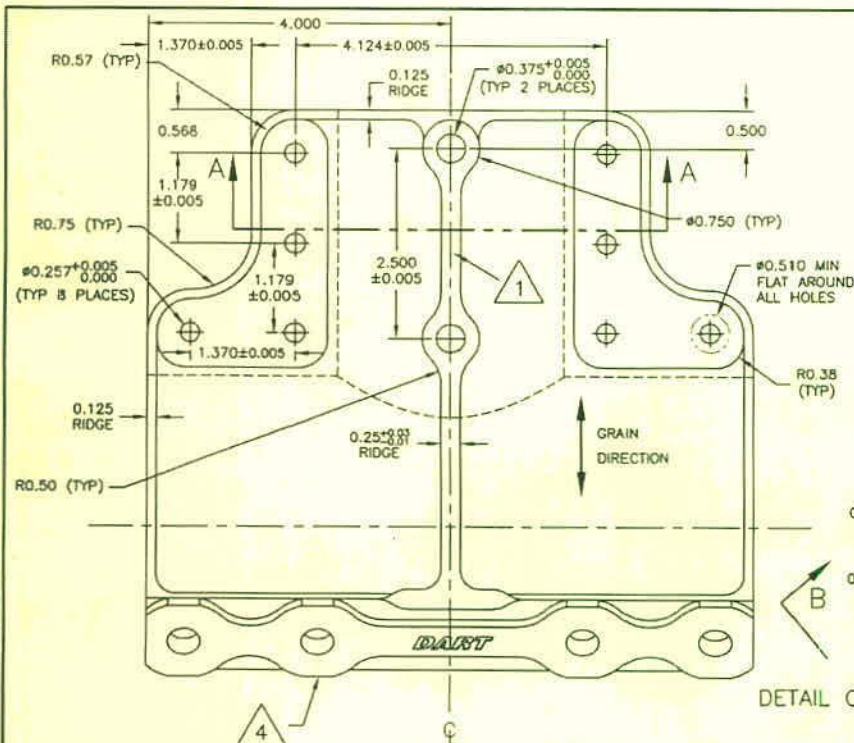
Measured by:	En
Date:	06/06/20

Audited by:	En
Date:	06/06/21

Rev	Date	Change	Revised by	Approved
A		New Issue	RF	
B	02.09.26	Re-format; Added Rev. D	KJ	
C	02.10.11	Re-format; Added DT8682, DT8683, DT8684	KJ	
D	05.05.05	Added dimension AI	KJ/RF	
E	05.12.05	Added dimension AJ	KJ/JLM	

RELEASED

05.12.06

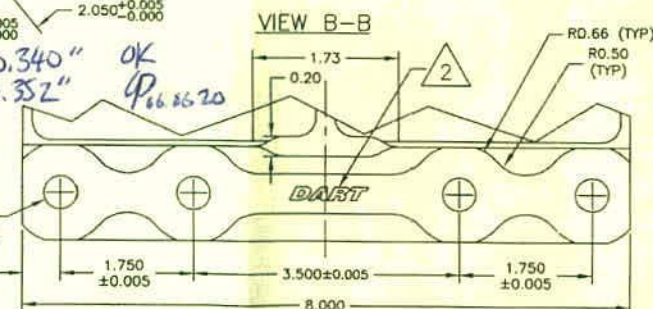


NOTES

MATERIAL: 7075-T7351 (Q0-A-250/12)
 (REF DART SPEC. D6102-001)
 FINISH: ACID ETCH, ALODINE PER DART QSI 005 4.1
 POWDER COAT GLOSS WHITE (REF 4.3.5.1) PER
 DART QSI 005 4.3
 BREAK ALL SHARP EDGES 0.010 TO 0.020
 TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED

- 1 ENGRAVE PART AND BATCH NUMBER IN THIS AREA TO MAX DEPTH OF 0.010
- 2 ENGRAVE DART LOGO TO MAX DEPTH OF 0.015 WITH MIN RAD 0.125
- 3 CHAMFER 0.063" x 45° AROUND THIS SURFACE (TYPICAL 2 PLACES)
- 4 CHAMFER 0.063" x 45° ALL AROUND
- 5 CHAMFER 0.033" x 45° (SEE DETAIL C)

VIEW B-B



E	05.07.13	ADD CHAMFER ON RIDGE NOTE 5
D	02.09.06	ADD RIDGES; TIGHTEN TOLERANCES
C	99.10.22	INCORP. DEO 9123/9079/9102 ADD DIMENSIONS PER TSR A1177
B	96.12.02	ADD GRAIN DIR., 0.438 WAS 0.425
A	96.09.16	NEW ISSUE
DESIGN	DS	DRAWN BY PH
CHECKED	#	APPROVED #
DATE	05.07.13	TITLE
		OUTER AFT SADDLE

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 DART AEROSPACE LTD.

DART AEROSPACE LTD.
HAWTHORNE, ONTARIO, CANADA

DRAWING NO. D2573

REV. E
SHEET 1 OF 1SCALE
2:3

SECTION A-A

DETAIL C
SCALE 4:3

SHOP COPY
 RETURN TO
 ENGINEERING
 UNCONTROLLED COPY
 SUBJECT TO AMENDMENT
 WITHOUT NOTICE
 WORK ORDER
 NO. 26974

1000

Chris Provencal

From: David Shepherd [dshepherd@dartaero.com]
Sent: June 20, 2006 3:01 PM
To: 'Chris Provencal'
Subject: RE: NCR D2573

Chris,

I think this is an acceptable deviation.
Please attach a copy of your analysis and this email to the work order.

Thanks,
David

-----Original Message-----

From: Chris Provencal [mailto:cprovencal@dartaero.com]
Sent: Tuesday, June 20, 2006 6:39 AM
To: davids@dartaero.com
Subject: NCR D2573

David,

D2573, qty(1), the thickness at the saddle-to-skidtube holes is under tolerance. The thickness should be 0.362. On one side it is 0.340" and the other side its 0.352". I will fax you a copy of the dwg and a copy of teh stress report that shows the margins are still positive. Is this part acceptable?

Sincerely,
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Saddle Analysis using 7075-T7351 Material

The following calculation will analyse the stresses in the 7075-T7351 saddle material.

a) Shear Tear Out Strength

$$P = 6369.6 \text{ lb}$$

$$F_{sud} = 40000 \text{ psi}$$

$$D_b = 0.4375 \text{ in}$$

$$t = 0.3125 \text{ in } 0.291$$

$$e = \frac{0.75 - D_b}{2} + 0.25 = 0.41$$

$$A_s = t \cdot e \cdot 2$$

$$A_s = 0.25 \cdot 0.2386$$

$$P_u = \frac{P}{A_s}$$

$$P_u = 25086.45 \text{ psi}$$

$$MS_{35} = \frac{F_{sud}}{P_u} - 1$$

$$MS_{35} = 0.59$$

7075-T7351 Material Shear Strength

Bushing Diameter

Saddle Thickness

Edge Distance

Shear Tear Out Area

Shear Stress

Margin of Safety

b) Saddle Bearing Strength

$$F_{bry} = 85000 \text{ psi}$$

$$D_b = 0.44 \text{ in}$$

$$t = 0.31 \text{ in } 0.291$$

$$A_{br} = D_b \cdot t$$

$$A_{br} = 0.14 \text{ in}^2 \cdot 0.128$$

$$P_{bru} = \frac{P}{A_{br}}$$

$$P_{bru} = 46589 \text{ psi}$$

$$MS_{36} = \frac{F_{bry}}{P_{bru}} - 1$$

$$MS_{36} = 0.82$$

7075-T7351 Material Bearing Strength

Bushing Diameter

Saddle Thickness at Bolt Locations

Bearing Area

Bearing Stress

Margin of Safety

c) ANSYS Analysis of Saddle Material

The photographs in Reference 1, show the ANSYS model of the saddle that was created for the purposes of stress analysis of the saddle material. Analyzing the application of the FAR load cases to landing gear indicated that the Drag Loading Condition (FAR 29.501c) produces the highest combined moments in the saddle region (see Ref. 1 for Maximum Combined Moments). The moments from a line element analysis of the landing gear were determined as follows for the aft and fwd saddles:

Aft Saddle: fwd/aft moment = 100240 lb in
front/back moment = 29094 lb in
twisting moment = 14789 lb in

Fwd Saddle fwd/aft moment = 82277 lb in
front/back moment = 33012 lb in
twisting moment = 4970 lb in

06.06.20

